English

Futurelight®
LIGHTING SYSTEMS MADE IN EUROPE

MH-860 Spotlight

User manual

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English

CAUTION!
Keep this device away from rain and moisture!
Unplug mains lead before opening the housing!

FOR YOUR OWN SAFETY, PLEASE READ THIS USER MANUAL CAREFULLY BEFORE YOU INITIAL START - UP!

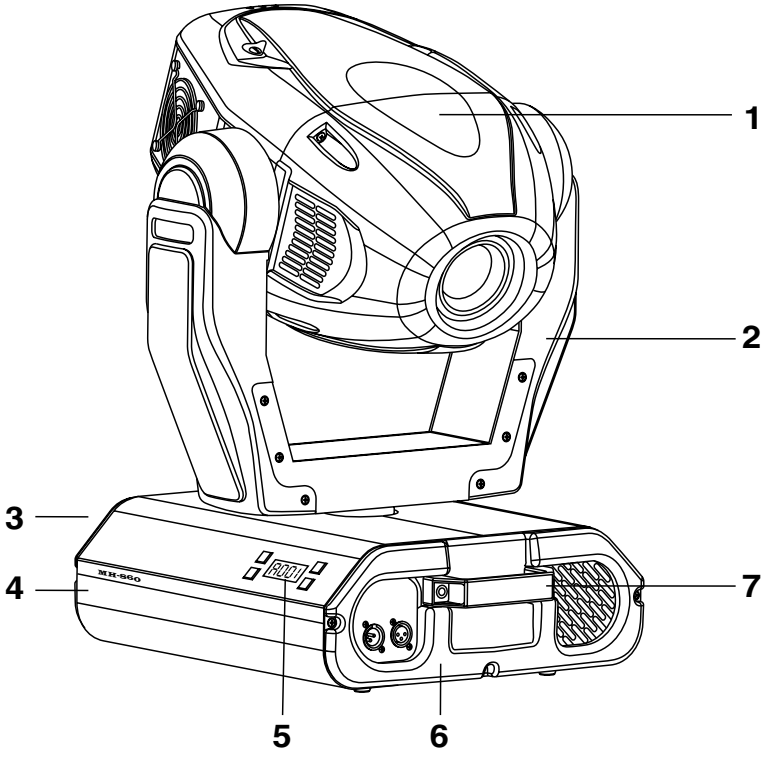
Introduction

Thank you for having chosen a FUTURELIGHT MH-860. You acquired a versatile, powerful and intelligent lighting-effect.
Unpack your FUTURELIGHT MH-860 and make sure that there are no damages caused by transportation. Should there be any, please consult your local dealer and do not take the device into operation.

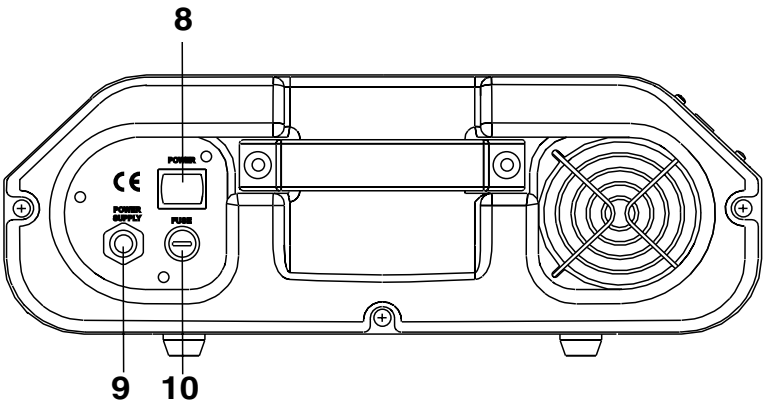
Features

Multi-function Moving-head
Colour-system: 2 colour-wheels • Colour-wheel 1 with 8 different, dichroic colour-filtres and white • Colour-wheel 2 with 5 different, dichroic colour-filtres and white and additionally with correction-filters 3,200 K and 6,000 K and UV-filter • Via the two correction-filters, up to 64 different colours and semi-colours can be created • Rainbow-effect in both directions • Gobo-wheel 1 with 9 static metal-gobos and open • With gobo-shake function for static gobos • Gobo-wheel 2 with 3 rotating metal-gobos, 1 glass-gobo, 2 multicolor-dichro-gobos and open • The rotating gobos can be turned by 360°, the adjusted position is memorized • The rotating gobos can be interchanged • Via the combination between dichro-gobos and color-wheel or multicolor-dichro-gobo even more colour-combinations possible • 4 additional metal-gobos and 2 glass-gobos are included • High-speed rotating 3-facet prism • Remotely controllable motorized focus • Combined shutter/dimmer unit allowing very smooth dimming and strobo effect 1-10 flash per sec. • Modular construction of fixture • Addressing, special functions setting, effects calibration via control panel with 4-digit LED display • Readout fixture and lamp usage, receiving DMX values, temperature, etc • Built-in analyzer for easy fault finding, error messages • Remotely switching of the lamp • Built-in demo sequences • Macro-function for rotating gobos/rotating prism combinations • Black-out while Head moving or gobo/colour/prism changing • Remotely controllable speed of Pan/Tilt movement for easy programming • Remote reset function • Intelligent control panel with 4-digit LED display • Silent fans cooling; remotely controllable speed of fans • 16 DMX-channels - 16 bit Pan/Tilt movement resolution • 14 DMX-channels - 8 bit Pan/Tilt movement resolution • Pan-movement range 530° • Tilt-movement range 280° • 8/16 bit movement resolution • Automatic Pan/Tilt position correction • High luminous-efficiency parabolic mirror and double condenser system • Motorized multi-step-zoom with three different apertures (15°, 18° and 22°) • Motorized focus controllable via DMX • Steplessly adjustable iris • Preprogrammed variable/random iris pulse effects • All lenses are anti-reflection coated • 14 high-quality stepper-motors for smooth movements • Self-resetable thermo-fuse • For PHILIPS MSD 575 GX-9,5, PHILIPS MSR 575/2 GX-9,5 or OSRAM HSR 575/2 GX-9,5 lamp • DMX-control via every standard DMX-controller • Suitable FUTURELIGHT controllers: CP-192 controller

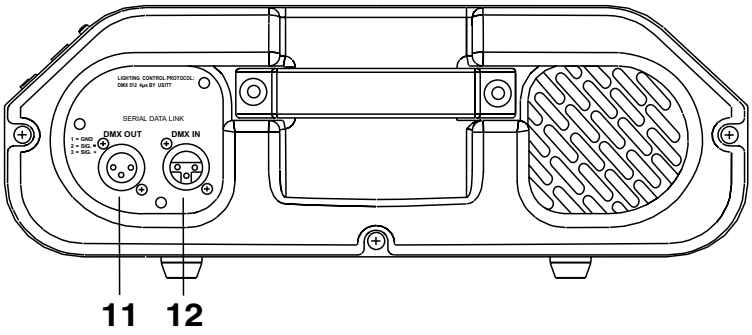
Description of the device



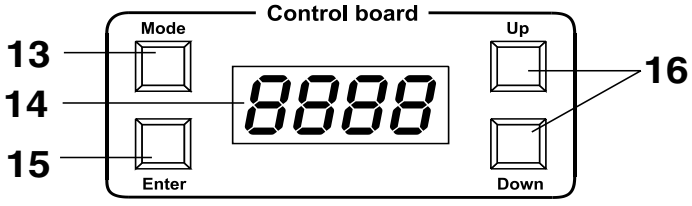
1 - Projector-head
2 - Yoke
3 - Left side panel
4 - Base
5 - Control Board
6 - Right side panel
7 - Carring handles



Left side panel:
8 - Power-switch
9 - Powercord
10 - Fuseholder



Right side panel:
11 - DMX-output
12 - DMX-input



Control Board:
13 - Mode-button
14 - Display
15 - Enter-button
16 - Up/Down-buttons

Safety instructions

CAUTION!

Be careful with your operations. With a dangerous voltage you can suffer a dangerous electric shock when touching the wires!

This device has left our premises in absolutely perfect condition. In order to maintain this condition and to ensure a safe operation, it is absolutely necessary for the user to follow the safety instructions and warning notes written in this user manual.

Important:
Damages caused by the disregard of this user manual are not subject to warranty. The dealer will not accept liability for any resulting defects or problems.

If the device has been exposed to drastic temperature fluctuation (e.g. after transportation), do not switch it on immediately. The arising condensation water might damage your device. Leave the device switched off until it has reached room temperature.

This device falls under protection-class I. The power plug must only be plugged into a protection class I outlet.
Never let the power-cord come into contact with other cables! Handle the power-cord and all connections with the mains with particular caution!

Make sure that the available voltage is not higher than stated on the rear panel.

Make sure that the power-cord is never crimped or damaged by sharp edges. Check the device and the power-cord from time to time.

Always disconnect from the mains, when the device is not in use or before cleaning it. Only handle the power-cord by the plug. Never pull out the plug by tugging the power-cord.

During the initial start-up some smoke or smell may arise. This is a normal process and does not necessarily mean that the device is defective.

Caution: During the operation, the housing becomes very hot.

Do not switch the device on and off in short intervals as this would reduce the lamp's life.

HEALTH HAZARD!

Never look directly into the light source, as sensitive persons may suffer an epileptic shock (especially meant for epileptics)!

Please consider that damages caused by manual modifications to the device are not subject to warranty.

Keep away children and amateurs!

Operating determinations

This device is a moving-head spot for creating decorative effects. This product is only allowed to be operated with an alternating current of 230 V, 50 Hz and was designed for indoor use only.

This device is designed for professional use, e.g. on stages, in discotheques, theatres etc.

Lighting effects are not designed for permanent operation. Consistent operation breaks will ensure that the device will serve you for a long time without defects.

Never run the device without lamp!

Do not shake the device. Avoid brute force when installing or operating the device.

Never lift the fixture by holding it at the projector-head, as the mechanics may be damaged. Always hold the fixture at the transport handles.

When choosing the installation-spot, please make sure that the device is not exposed to extreme heat, moisture or dust. There should not be any cables lying around. You endanger your own and the safety of others!

The minimum distance between light-output and the illuminated surface must be more than 1 meter.

Make sure that the area below the installation place is blocked when rigging, derigging or servicing the fixture.

Always fix the fixture with an appropriate safety-rope. Fix the safety-rope at the correct holes only.

Only operate the fixture after having checked that the housing is firmly closed and all screws are tightly fastened.

The lamp must never be ignited if the objective-lens or any housing-cover is open, as discharge lamps may explose and emit a high ultraviolet radiation, which may cause burns.

The maximum ambient temperature t_a must never be exceeded.

CAUTION!
The lens has to be replaced when it is obviously damaged,
so that its function is impaired, e. g. due to cracks or deep scratches!

Operate the device only after having familiarized with its functions. Do not permit operation by persons not qualified for operating the device. Most damages are the result of unprofessional operation!

CAUTION!
The lamp has to be replaced when it is damaged
or deformed due to the heat!

Please use the original packaging if the device is to be transported.

Please consider that unauthorized modifications on the device are forbidden due to safety reasons!

Never remove the serial barcode from the device as this would make the guarantee void.

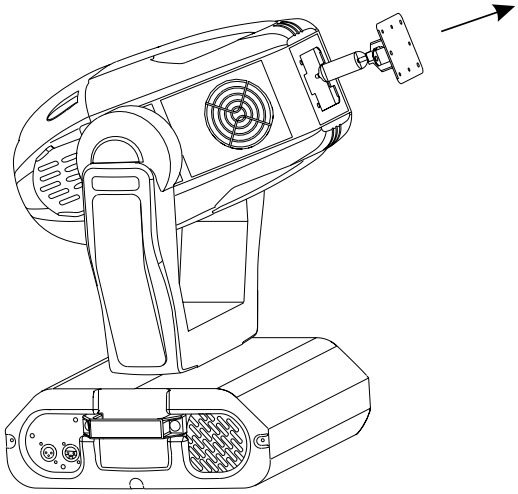
If this device will be operated in any way different to the one described in this manual, the product may suffer damages and the guarantee becomes void. Furthermore, any other operation may lead to dangers like short-circuit, burns, electric shock, lamp explosion, crash etc.

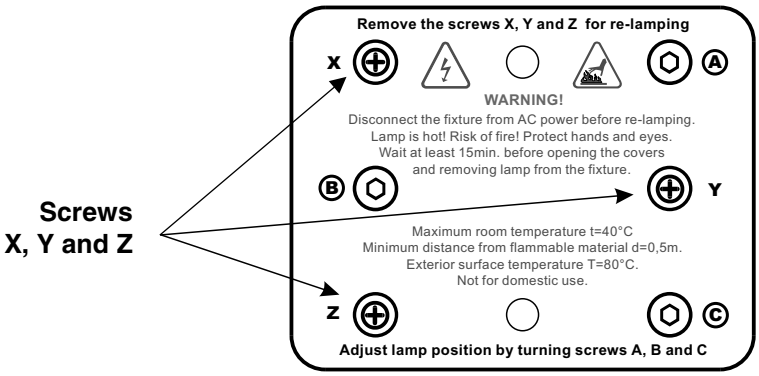
Installation

Fitting/Exchanging the lamp

DANGER HIGH VOLTAGE

DANGER!
Install the lamp with the device switched off only.
Unplug from mains before!

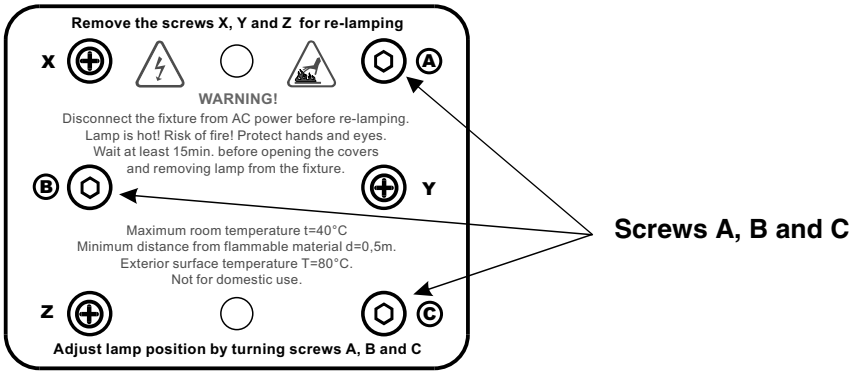



Screws
X, Y and Z
Remove the screws X, Y and Z for re-lamping
X
A
WARNING!
Disconnect the fixture from AC power before re-lamping.
Lamp is hot! Risk of fire! Protect hands and eyes.
Wait at least 15min. before opening the covers
and removing lamp from the fixture.
B
Y
Maximum room temperature t=40°C
Minimum distance from flammable material d=0,5m.
Exterior surface temperature T=80°C.
Not for domestic use.
Z
C
Adjust lamp position by turning screws A, B and C

To insert the lamp OSRAM HSR 575/2 95 V/575 W GX-9,5 or PHILIPS MSR 575/2 95 V/575 W GX-9,5, MSD 575 95 V/575 W GX-9,5 open the small cover at the head's rearpanel (see the drawing) by loosening the 3 Phillips screws **X, Y and Z** on the cover.
Gently pull out the lamp assemby.
If changing the lamp, remove the old lamp from the socket. Insert the lamp to the socket.
Do not install a lamp with a higher wattage! A lamp like this generates temperatures the device is not designed for.
Damages caused by non-observance are not subject to warranty. Please follow the lamp manufacturer‘s notes!
Do not touch the glass-bulb bare-handed during the installation! Make sure that the lamp is installed tightly into the lampholder system.
Reinsert the lamp assembly and tighten the 3 screws again.
Before striking the lamp, reset the **"LAti"** counter in the main menu of the Control Board, by pressing the "Up" and "Down" buttons in one time and then confirming with the Enter-button.

Do not operate the fixture with opened housing-cover!

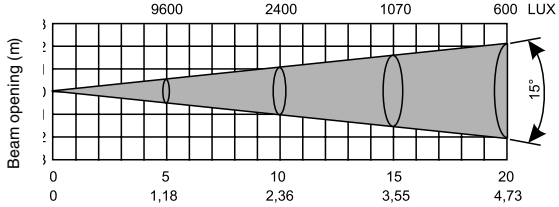
Lamp adjustment


Remove the screws X, Y and Z for re-lamping
X
A
WARNING!
Disconnect the fixture from AC power before re-lamping.
Lamp is hot! Risk of fire! Protect hands and eyes.
Wait at least 15min. before opening the covers
and removing lamp from the fixture.
B
Y
Maximum room temperature t=40°C
Minimum distance from flammable material d=0,5m.
Exterior surface temperature T=80°C.
Not for domestic use.
Z
C
Adjust lamp position by turning screws A, B and C
Screws A, B and C

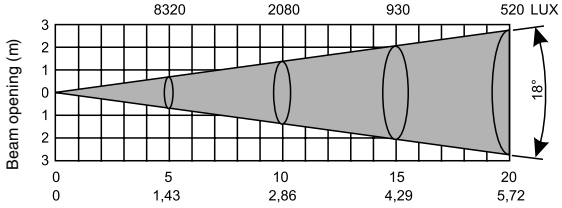
The lampholder is aligned at the factory. Due to differences between lamps, fine adjustment may improve light performance.
Strike the lamp, open the shutter and the iris, set the dimmer intensity onto 100 % and focus the light on a flat surface (wall). Center the hot-spot (the brightest part of the beam) using the 3 adjustment screws **"A, B, C"**. Turn one screw at a time to drag the hot-spot diagonally across the projected image. If you cannot detect a hot-spot, adjust the lamp until the light is even.
To reduce a hot-spot, pull the lamp in by turning all three screws **"A, B, C"** clockwise ¼-turn at a time until the light is evenly distributed.
If the light is brighter around the edge than it is in the center, or if light output is low, the lamp is too far back in the reflector. "Push" the lamp out by turning the screws **"A, B, C"** counterclockwise ¼-turn at a time the light is bright and evenly distributed.

Beampath

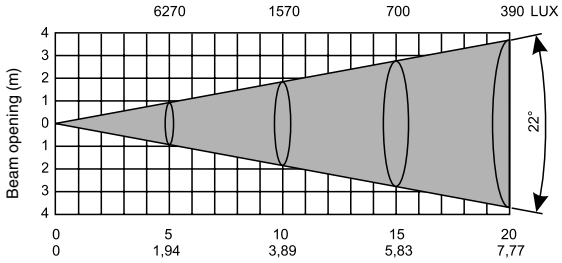
15° radiation angle



18° radiation angle



22° radiation angle



Inserting/Exchanging gobos

DANGER!
Install the gobos with the device switched off only.
Unplug from mains before!

To insert the gobos open the top cover of the head by loosening the 4 Phillips screws on the front and rear sides of the top cover.

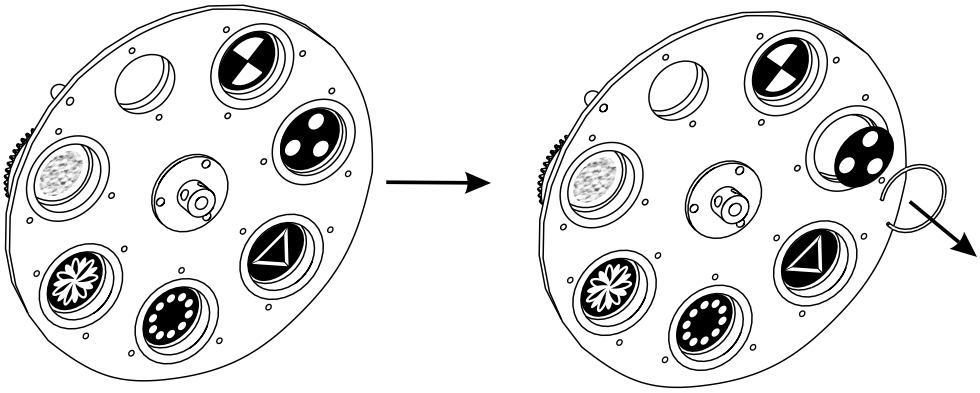
If you wish to use other forms and patterns as the standard-gobos, or if gobos are to be exchanged, please follow the instructions below:

Static gobo-wheel:
Carefully press the gobo out of the fixation. Make sure that you do not damage the clamps.

Rotating gobo-wheel:

CAUTION!
Never unscrew the screws of the rotating gobo as the ball bearing will otherwise be opened!

Remove the fixation-ring with an appropriate tool. Remove the gobo and insert the new gobo. Press the fixation-ring together and insert it in front of the gobo.



Rigging

DANGER TO LIFE!

Please consider the EN 60598-2-17 and the respective national norms during the installation! The installation must only be carried out by an authorized dealer!

The installation of the projector has to be built and constructed in a way that it can hold 10 times the weight for 1 hour without any harming deformation.

The installation must always be secured with a secondary safety attachment, e.g. an appropriate catch net. This secondary safety attachment must be constructed in a way that no part of the installation can fall down if the main attachment fails.

When rigging, derigging or servicing the fixture staying in the area below the installation place, on bridges, under high working places and other endangered areas is forbidden.

The operator has to make sure that safety-relating and machine-technical installations are approved by an expert before taking into operation for the first time and after changes before taking into operation another time.

The operator has to make sure that safety-relating and machine-technical installations are approved by an expert after every four year in the course of an acceptance test.

The operator has to make sure that safety-relating and machine-technical installations are approved by a skilled person once a year.

Procedure:
The projector should be installed outside areas where persons may walk by or be seated.

IMPORTANT! OVERHEAD RIGGING REQUIRES EXTENSIVE EXPERIENCE, including (but not limited to) calculating working load limits, installation material being used, and periodic safety inspection of all installation material and the projector. If you lack these qualifications, do not attempt the installation yourself, but instead use a professional structural rigger. Improper installation can result in bodily injury and.or damage to property.

The projector has to be installed out of the reach of people.

If the projector shall be lowered from the ceiling or high joists, professional trussing systems have to be used. The projector must never be fixed swinging freely in the room.

Caution: Projectors may cause severe injuries when crashing down! If you have doubts concerning the safety of a possible installation, do NOT install the projector!

Before rigging make sure that the installation area can hold a minimum point load of 10 times the projector's weight.

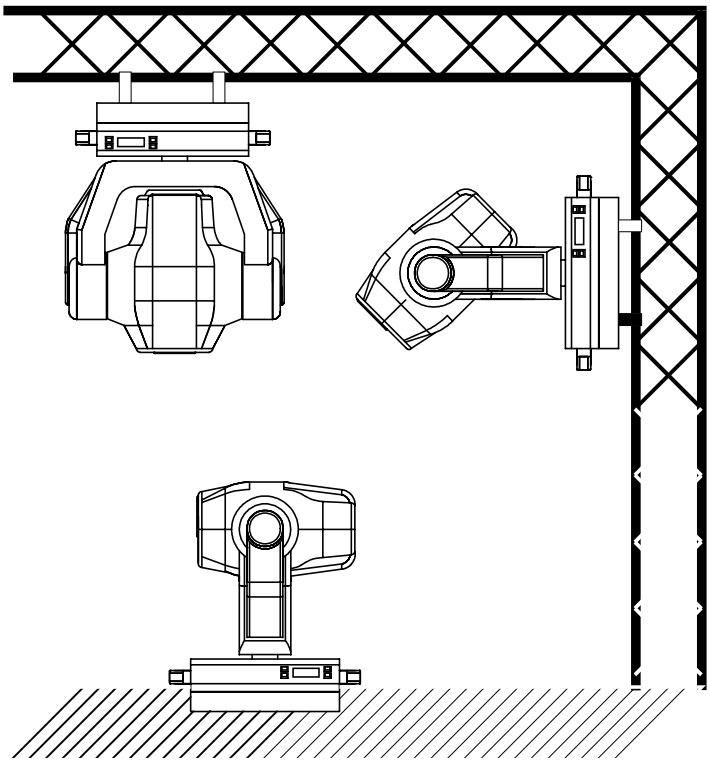
DANGER OF FIRE!
When installing the device, make sure there is no highly-inflammable material (decoration articles, etc.) within a distance of min. 0.5 m.

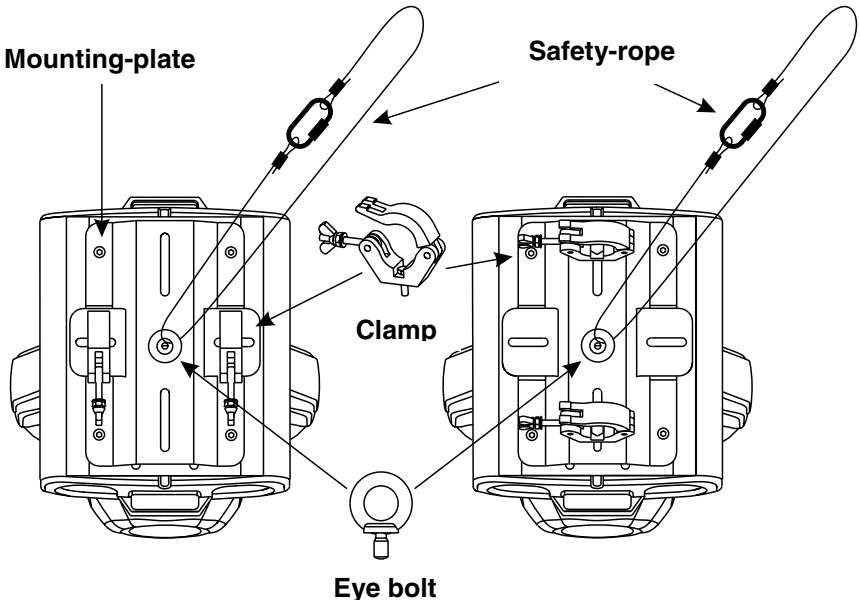
CAUTION!
Use 2 appropriate clamps to rig the fixture on the truss.
Follow the instructions mentioned at the bottom of the base.
Make sure that the device is fixed properly! Ensure that the structure (truss) to which you are attaching the fixtures is secure.

The Moving-Head can be placed directly on the stage floor or rigged in any orientation on a truss without altering its operation characteristics (see the drawing).

The fixture's base enables to be mounted in two ways. Use the clamps with screws M10 or M8 - check the base bottom.

For overhead use, always install a safety-rope that can hold at least 10 times the weight of the fixture. You must only use safety-ropes with screw-on carabines. Pull the safety-rope through the eye bolt on the bottom of the base and over the trussing system etc. Insert the end in the carabine and tighten the fixation screw.





Connection with the mains

Connect the device to the mains with the power-plug.

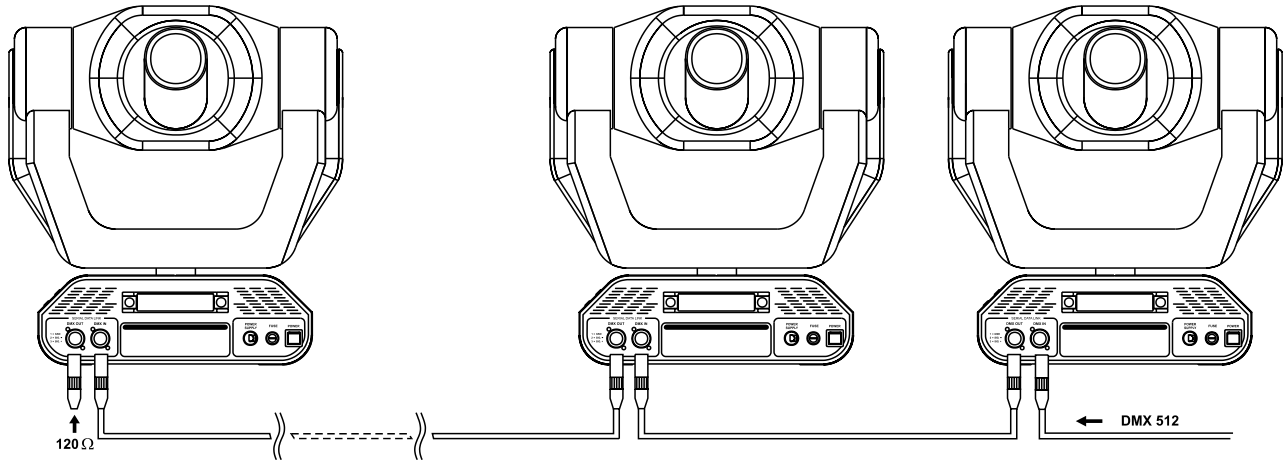
The occupation of the connection-cables is as follows:

Cable	Pin	International
Brown	Live	L
Blue	Neutral	N
Yellow/Green	Earth	⏚

The earth has to be connected! In general, lighting effects should not be connected to dimming-packs.

DANGER TO LIFE!
Before taking into operation for the first time, the installation has to be approved by an expert!

DMX-512 connection / connection between fixtures



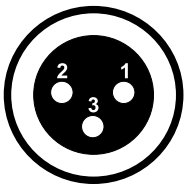
The wires must not come into contact with each other, otherwise the fixtures will not work at all, or will not work properly.

Only use a stereo shielded cable and 3-pin XLR-plugs and connectors in order to connect the controller with the fixture or one fixture with another.

Occupation of the XLR-connection:

DMX-output

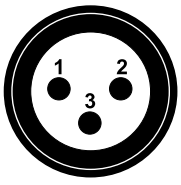
XLR mounting-socket:



1: Ground
2: Signal (–)
3: Signal (+)

DMX-input

XLR mounting-plug:



1: Ground
2: Signal (–)
3: Signal (+)

If you are using the recommended FUTURELIGHT-controllers, you can connect the DMX-output of the controller directly with the DMX-input of the first fixture in the DMX-chain. If you wish to connect DMX-controllers with other XLR-outputs, you need to use adapter-cables.

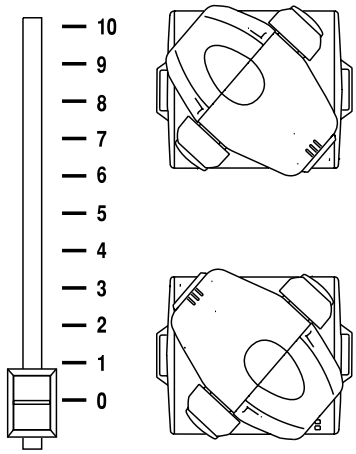
Building a serial DMX-chain:
Connect the DMX-output of the first fixture in the DMX-chain with the DMX-input of the next fixture. Always connect one output with the input of the next fixture until all fixtures are connected.

Caution: At the last fixture, the DMX-cable has to be terminated with a terminator. Solder a 120 Ω resistor between Signal (–) and Signal (+) into a 3-pin XLR-plug and plug it in the DMX-output of the last fixture.

Function of the control channels - 16 bit protocol

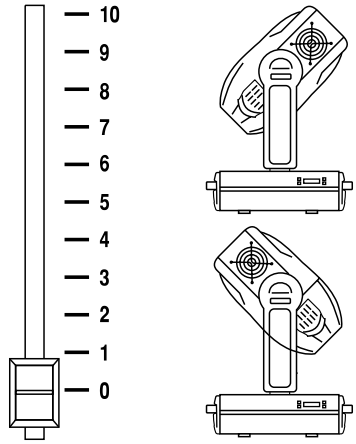
Channel 1 - Horizontal movement (Pan)

Push slider up in order to move head horizontally (PAN).
Gradual head adjustment from one end of the slider to the other (0-255, 128-center). The head can be turned by 530° and stopped at any position you wish.



Channel 2 - Vertical movement (Tilt)

Push slider up in order to move head vertically (TILT).
Gradual head adjustment from one end of the slider to the other (0-255, 128-center). The head can be turned by 280° and stopped at any position you wish.



Channel 3 - Pan fine 16 bit

Channel 4 - Tilt fine 16 bit

Channel 5 - Speed of PAN / TILT movement

0	Max speed (tracking mode)
1	Max speed (vector mode)
249	Min. speed (vector mode)
250-252	Max. speed (tracking mode), black-out color or gobo changes
253-255	Max. speed (tracking mode), black-out while PAN, TILT moving or color gobo changes

Channel 6 - Switch on / off the lamp, reset, speed control of cooling fan

0	Open, max. speed of fan
127	Open, min. speed of fan (silent operation) from 0 to 127 - decreasing speed of fan
128 - 139	Switch on the lamp, reset, open position
140 - 239	No function
230 - 239	Switch off the lamp after 3 seconds
240 - 255	No function

English

Channel 7 - Colour-wheel 1

Linear colour change following the movement of the slider. In this way you can stop the colour-wheel in any position - also between two colours creating double-coloured beams.
Between 128 and 190 and between 194 and 255, the colour-wheel rotates continuously the so-called "Rainbow" effect.

0	Open / white
13	Light Blue
26	Red
38	Blue
51	Light green
64	Yellow
77	Magenta
90	Cyan
102	Green
115	Orange
128 - 190	Forwards rainbow effect from fast to slow
191 - 193	No rotation
194 - 255	Backwards rainbow effect from slow to fast
0 - 255	Colour macro function (channel 8 set from 128 - 255) - 64 different colours in following order: white, pink, magenta, red, orange, yellow, green, cyan, blue, UV

Channel 8 - No function

0 - 11	White
12 - 23	Deep red
24 - 35	Deep blue
36 - 47	Pink
48 - 59	CyanCyan
60 - 71	Magenta
72 - 83	Yellow
84 - 95	6000 K correction filter
96 - 107	3200 K correction filter
108 - 119	UV filter
120 - 127	White
128 - 255	Enable macro color function on channel 7

Channel 9 - Prism-wheel

0	Open position (no prism)
1 - 63	Forwards rotation from fast to slow
64	No rotation
65 - 127	Backwards rotation from slow to fast
128 - 255	**Prism/Gobo macros**
128 - 135	Macro 1
136 - 143	Macro 2
144 - 151	Macro 3
152 - 159	Macro 4
160 - 167	Macro 5
168 - 175	Macro 6
176 - 183	Macro 7
184 - 191	Macro 8
192 - 199	Macro 9
200 - 207	Macro 10
208 - 215	Macro 11
216 - 223	Macro 12
224 - 231	Macro 13
232 - 239	Macro 14
240 - 247	Macro 15
248 - 255	Macro 16

Channel 10 - Static gobo-wheel

0 - 7	Open/hole
8 - 15	Gobo 1
16 - 23	Gobo 2
24 - 31	Gobo 3
32 - 39	Gobo 4
40 - 47	Gobo 5
48 - 55	Gobo 6
56 - 63	Gobo 7
64 - 71	Gobo 8
72 - 79	Gobo 9
80 - 223	**Shaking gobos with variable speed:**
80 - 95	Gobo 1
96 - 111	Gobo 2
112 - 127	Gobo 3
128 - 143	Gobo 4
144 - 159	Gobo 5
160 - 175	Gobo 6
176 - 191	Gobo 7
192 - 207	Gobo 8
208 - 223	Gobo 9
224 - 255	Gobo wheel rotation from slow to fast

Channel 11 - Rotating gobo-wheel

0 - 31	Open
32 - 63	Rot. gobo 1 (metal)
64 - 95	Rot. gobo 2 (metal)
96 - 127	Rot. gobo 3 (metal)
128 - 159	Rot. gobo 4 (multicolor dichroic)
160 - 191	Rot. gobo 5 (multicolor dichroic)
192 - 223	Rot. gobo 6 (glass)
224 - 255	Rot. gobo wheel cont. rotation slow to fast

Channel 12 - Rotating gobo index, rotating gobo rotation

0 - 127	Gobo indexing
128 - 191	Forwards gobo rotation from fast to slow
191 - 192	No rotation
193 - 255	Backwards gobo rotation from slow to fast

Channel 13 - Iris

0	Open
1 - 179	Max. diameter to min. diameter
180 - 191	Closed
192 - 223	Pulse closing from slow to fast
224 - 255	Pulse opening from fast to slow

Channel 14 - Focus, multi-step zoom

0 - 85	Zoom 15° (Continuous adjustment from far to near)
86 - 170	Zoom 18° (Continuous adjustment from far to near)
71 - 255	Zoom 22° (Continuous adjustment from far to near)

Channel 15 - Shutter, Strobe

0 - 31	Shutter closed
32 - 63	No function (Shutter open)
64 - 95	Strobe-effect from slow to fast (max. 10 flashes/second)
96 - 127	No function (Shutter open)
128 - 159	Pulse-effect in sequences
160 - 191	No function (Shutter open)
192 - 223	Random strobe-effect from slow to fast
224 - 255	No function (Shutter open)

Channel 16 - Dimmer intensity

0 - 255	Gradual adjustment of the dimmer intensity from 0 to 100 %

Function of the control channels - 8 bit protocol:

DMX Channel	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Function	PAN	TILT	PAN/TILT SPEED	FAN ON/OFF LAMP	COLOUR WHEEL 1	COLOUR WHEEL 2	PRISM WHEEL	STATIC GOBOS	ROTATING GOBOS	GOBO ROTATION	IRIS	FOCUS	STROBE	DIMMER

Addressing

The Control Board on the top side of the MH-860 allows you to assign the DMX fixture address, which is defined as the first channel from which the MH-860 will respond to the controller.
If you set, for example, the address to channel 5, the MH-860 will use the channel 5 to 20 for control.
Please, be sure that you don't have any overlapping channels in order to control each MH-860 correctly and independently from any other fixture on the DMX data link.
If two, three or more MH-860 are addressed similarly, they will work similarly.

For address setting follow this procedure:

1. Switch on the MH-860 and wait until the fixture reset has finished (**"rSt"** is flashing at the display).
2. Press the **[Mode]** key in order to access the main menu. Browse through the menu by pressing the [Up] and [Down] keys until the display shows **"A001"**. Confirm by pressing **[Enter]** key and the letter **"A"** will flash.
3. Use the [Up] and [Down] keys to select the desired address.
4. Confirm by pressing **[Enter]** or **[Mode]** to cancel.

Controlling:

After having addressed all MH-860 , you may now start operating these via your lighting controller.
Note:
After switching on, the MH-860 will automatically detect whether DMX 512 data is received or not. If there is no data received at the DMX-input, the display will start to flash **"A001"** with actually set address.
This situation can occurr if:
- the 3 PIN XLR plug (cable with DMX signal from controller) is not connected with the input of the MH-860
- the controller is switched off or defective, if the cable or connector is defective or the signal wires are swap in the input connector.

Note:
It's necessary to insert the XLR termination plug (with 120 Ohm) in the last lighting in the link in order to ensure proper transmission on the DMX data link.

Remotely controllable functions

Lamp

The MH-860 is to be operated with a OSRAM HSR 575/2 95 V/575 W GX-9,5 or PHILIPS MSR 575/2 95 V/575 W GX-9,5, MSD 575 95 V/575 W GX-9,5 lamp.
A relay inside of the MH-860 allows you to switch on and off the lamp via the Control Board on the top side or via your controller without affecting the rest of the lighting.

Switching on and off the lamp via the Control Board

1. Switch on the MH-860 and wait until the fixture reset has finished.
2. Press the **[Mode]** key in order to access the main menu. Browse through the menu by pressing the [Up] and
[Down] keys until the display shows **"LAMP"**. Confirm by pressing **[Enter]** key.
3. Use the [Up] and [Down] keys to select **"On"** for switching on the lamp and **"Off"** for switch off the lamp and press **[Enter]** to confirm or **[Mode]** to cancel.

Note :
It is also important to note that the discharge lamp is a cold restrike type, which means that it has to be cold before re-striking. For this reason, you have to wait 5 minutes (max. speed of fan must be adjusted) after having switched off the lamp before you can switch it back on again. If you try to switch on the lamp within 5 minutes after having switched it off, the MH-860 will store this information and automatically ignite the lamp when the 5 minutes period has expired. The message **"HEAt"** will appear on the control board display at the back side of the MH-860. If the ignition of the lamp is seven times unsuccessful, on the display will appear **"LA.Er"**, meaning that the lamp could be damaged or even missed, or there could be a failure on the ignitor or ballast.

Colour wheels

The MH-860 has two colours wheels both with 10 color positions - 9 of these with dichroic colors and the last one open. Colour-wheel 1 can be positioned between two adjacent colors in any position. It is also possible to rotate colour-wheel 1 continuously at different speeds („Rainbow effect“) in both directions. Hot and cold colour temperature filters (3200 K and 6000 K) and the UV-filter are situated on colour wheel 2.
By color macro function it is possible to obtain 64 different colours in following order: white, pink, magenta, red, orange, yellow, green, cyan, blue, UV

Static gobo wheel

This wheel has 9 metal gobos + open position, all gobos are interchangeable. The gobos have an outside diameter of 27 mm and an image diameter of 23 mm. Gobo wheel rotation from slow to fast can be also adjusted. Furthermore, it has the gobo-shake function.

Rotating gobo-wheel

The rotating gobo-wheel includes 3 metal gobos, 1 glass gobo and 2 multicolor dichroic gobos rotating in both directions, indexable, rotating gobo wheel cont. rotation slow to fast. All gobos are interchangeable. The gobos have an outside diameter of 27 mm and an image diameter of 23 mm.

3-facet rotating prism

3-facet prism rotating in both directions at different speeds. Control via 16 prism-gobo-macros.

Iris

Motorized iris for different beam diameters

Focus - multistep zoom

Motorized focus enables the beam to be focused anywhere on stage at different beam angles: 15°, 18°, 22°, provided by the special multistep zoom (3 steps).

Focus

Motorized focus enables the beam to be focused anywhere on stage.

Dimmer / Shutter / Strobe

Smooth 0 - 100 % dimming is provided by the combined mechanical dimmer / shutter unit. This unit may also be used for strobe-effects (1 - 10 flashes per second)

Fan

The MH-860 is cooled by three axial fans - one each in the projector head and one in the base. The speed of the fan (and of course the noise) can be continuously reduced if very quiet performance is required.
By the Control Board using the **"FAnS"** function you can choose 5 types of low fan speed operating. Please refer to the instructions under SPEC -Special functions.

Control Board

The Control Board situated on the top side of the MH-860 offers several features. You can simply set the lighting address, read the number of lamp or unit hours, switch on and off the lamp, run demonstration sequences, make a reset and also use special functions for manual control and service purposes.
The main menu is accessed by pressing the **[Mode]** key - press this one so many times until the display shows message **"A001"** (with actually stored address). Browse through the menu by the pressing [Up] and [Down] keys - the display shows step by step these messages: **A001, rPAn, rTilt, 16br, Lati, Poti, LAMP, dEMo, rESE, SPEC**. Press **[Enter]** if you wish to select one of them. The functions provided are described in the following sections and the function hierarchy is shown below.

Main functions

A001 - DMX 512 Address settings

The letter **"A"** flashes. Use the [Up] and [down] keys to select required address (001 - 512) and press **[Enter]** to confirm or **[Mode]** to cancel and return to the main menu.

rPAn - Pan reverse

This function allows you to invert the Pan-movement. Use the [Up] and [Down] keys to select **"On"** if you wish this feature or **"Off"** if you don't wish this feature and press **[Enter]** to confirm or **[Mode]** to cancel and return to the main menu.

rtilt - Tilt reverse

This function allows you to invert the Tilt-movement. Use the [Up] and [Down] keys to select **"On"** if you wish this feature or **"Off"** if you don't wish this feature and press **[Enter]** to confirm or **[Mode]** to cancel and return to the main menu.

16br - Movement resolution

By this function you can adjust the desired movement resolution 8 or 16 bit. Use the [Up] and [Down] keys to select '**On**' if you wish the 16bit high resolution or **"Off"** if you wish only 8 bit resolution and press **[Enter]** to confirm or **[Mode]** to cancel and return to the main menu.
Note:
If you adjust the 16 bit resolution the fixture will occupy 16 DMX channels, if you adjust the 8 bit resolution, the fixture will be operated by only 14 DMX channels. Please, check the DMX protocol.

LAti - Lamp On time

This option enables you to read the total number of hours that the lamp has been powered on. Press **[Enter]** or **[Mode]** to return to the main menu. In order to reset the counter to 0, you have to hold the Up- and Down-button and press the Enter-button.

Poti - Power On time

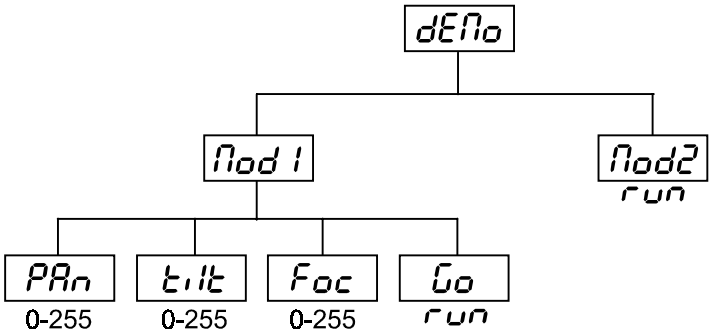
By this option you can read the total number of hours that the MH-860 has been powered on. Press **[Enter]** or **[Mode]** to return to the main menu.

LAMP - Switch on / off the lamp

Use the **[Up]** and **[Down]** keys to select **"On"** if you wish the switch on the lamp or **"Off"** if you wish switch off the lamp and press **[Enter]** to confirm or **[Mode]** to cancel and return to the main menu.

dEMo - Demo sequences

This function allows you to run a special demo-test sequences without an external controller, which will show you some possibilities of using MH-860. Press **[Up]** and **[Down]** keys to select the **"Mod1"** or **"Mod2"** sequences. The **"Mod1"** is suitable for projections on the wall, ceilling or ground without any head-movement, the **"Mod2"** uses all MH-860 functions and therefore is good for a complete introduction of the fixture.

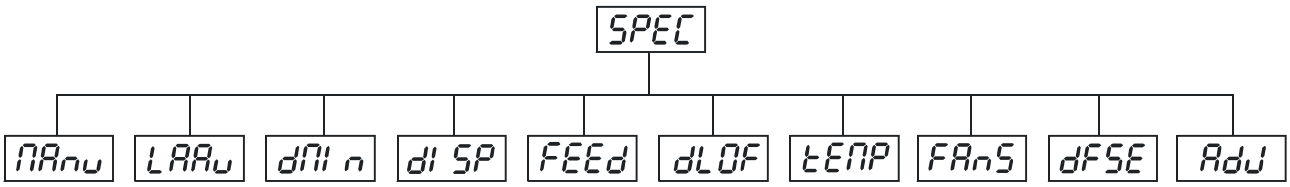


rESE - Reset Function

Press **[Enter]** key to run reset. This option enables the MH-860 to index all effects (functions) and return to their standard positions.

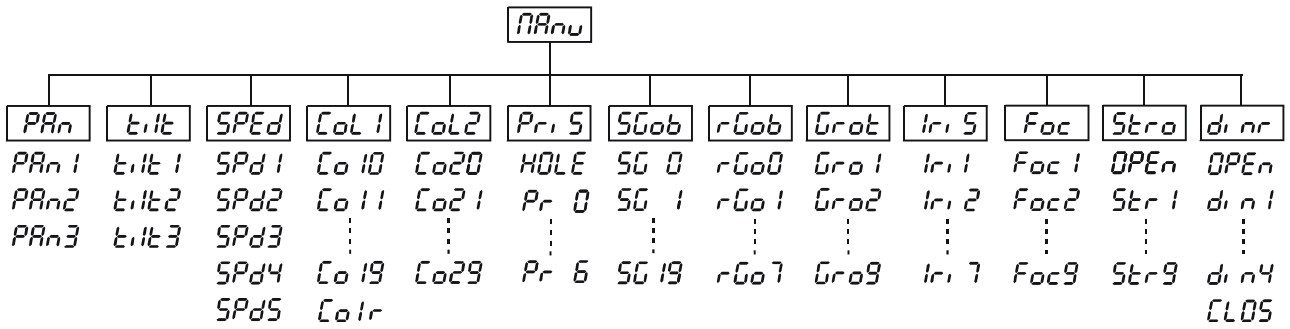
SPEC -Special functions

Use the **[Up]** and **[Down]** keys to browse through the special functions and select the one by pressing **[Enter]**.



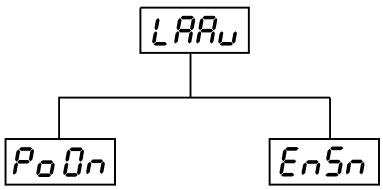
MAnu - Manual control of effects

This function allows you to control manually the channel functions of the fixture. Use the [Up] and [Down] keys to select desired function and press **[Enter]** to adjust the effect or **[Mode]** to cancel and return to the menu.



LAAu- Lamp On automatically

This menu allows you to turn the lamp on after switching the fixture on and switch on/off the lamp light sensor.



PoOn- Lamp On after switching the fixture on

This function enables to switch on the lamp automatically after switching on the fixture. Use the [Up] and [Down] keys to select **„On"** if you wish to switch on the lamp automatically after switching on the fixture or **„Off"** if you wish the lamp off after switching on the fixture and press **[Enter]** to confirm or **[Mode]** to cancel and return to the menu.

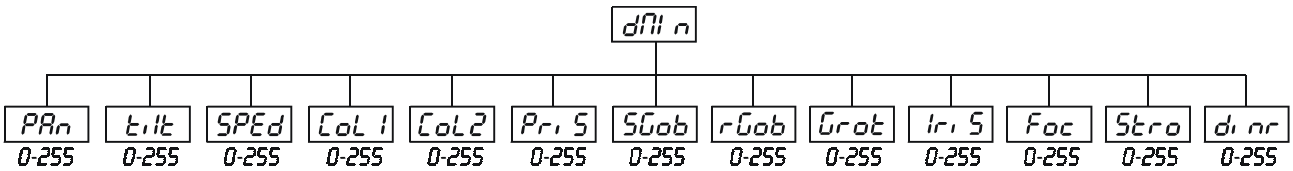
EnSn - Switch On/Off the lamp light sensor

Use the **[Up]** and **[Down]** keys to select **"On"** if you wish to switch the lamp light sensor On and press **[Enter]** to confirm or **[Mode]** to cancel and return to the menu.The option"On" is for the

standard operation.
Use the **[Up]** and **[Down]** keys to select **"Off"** if you wish to switch the lamp light sensor Off and press **[Enter]** to confirm or **[Mode]** to cancel and return to the menu.
Important: The option"Off" is for "emergency operation" only if the lamp light sensor is defective and you will wait for a delivery of the spare light sensor! If the lamp light sensor was switched Off, the error messages **"LAEr,SnEr,HEAt"** will not appear on the display (only the message **"HEAt"** will appear if the lamp was turned Off and On within 5 minutes) and at switching On of the lamp the electronics will still try to ignite the lamp until it shines (even when the lamp is damaged or absent), on this account some electronics parts could be damaged!

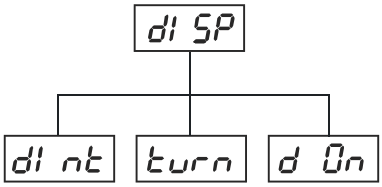
dMX n - DMX values

Readout DMX values of each channel received by the fixture. Use the **[Up]** and **[Down]** keys to select desired channel and press **[Enter]** to read its value coming to the fixture or **[Mode]** to cancel and return to the menu.



di SP - Display-adjusting

This function allows you to adjust the display settings:



d Int - Display intensity

With this function, you can adjust the display-intensity from 20 % to 100 %. Use the **[Up]** and **[Down]** keys to select the level of the display-intensity and press **[Enter]** to confirm or **[Mode]** to cancel and return to the menu.

turn - Display-reverse

With this function, you can rotate the display by 180°. Use the **[Up]** and **[Down]** keys to select **"normal display"** or **"display turned by 180°"** and press **[Enter]** to confirm or **[Mode]** to cancel and return to the menu.

d On- Display-On

This function allows you to keep the display on or to turn off automatically 2 minutes after last pressing any key on the control board. Use the **[Up]** and **[Down]** keys to select **"On"** if you wish to keep the display on or **"Off"** if you wish to turn off automatically 2 minutes after last pressing any key on the Control Board and press **[Enter]** to confirm or **[Mode]** to cancel and return to the menu.

FEEd - PAN/TILT-Feedback:

This function allows to return the Mowing Head to the required position after changing the position by external force (e. g. by stroke). Use the **[Up]** and **[Down]** keys to select **"On"** if you wish to enable this function or **"Off"** if you wish not to return the Moving Head to the required position and press **[Enter]** to confirm or **[Mode]** to cancel and return to the menu.
Note: If feedback was switched Off, the PAN/TILT-position is changed by external force and feedbeck is switched On again, the Moving Head might not to be synchronized with the DMX signal. You have to make a reset in order to synchronize the Moving Head with the DMX signal.

dLOF - Lamp off via DMX

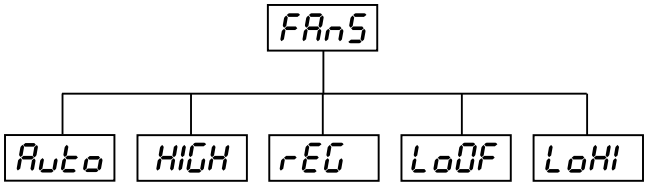
This function allows you to switch off the lamp by DMX. Use the **[Up]** and **[Down]** keys to select **"On"** if you want to switch off the lamp by DMX or **"Off"** if you don't want to switch off the lamp by DMX and press **[Enter]** to confirm or **[Mode]** to cancel and return to the menu.

tEMP - Temperature

Inside temperature readouts of the fixture in Celsius. Inside temperatures below 80° C are not critical. 80° C and more lead to the lamp being switched off. Please note that the outside temperature should not exceed 45° C.

FAnS - Fan speed operating

By using this function you can choose 5 types of fan speed operating. Browse through this menu by the pressing **[Up]** and **[Down]** keys - the display shows step by step the following messages: **"Auto, HIGH, reG, Lo.HI, Lo.OF"**. Press **[Enter]** if you wish to select one of them or **[Mode]** to cancel and return to the menu.



Auto - continuous controlling of the fan speed without the DMX value

This mode is similar to "reG", but the initial level of the fan speed can´t be adjusted by DMX.

HI GH - high speed of the fans

The cooling fans work on max. speed (max. cooling).

rEG - continuous controlling of the fan speed

The fan automatically raises its speed in order to control inside temperature of the lighting, if the temperature inside increases about certain level (the low fan speed reduces the cooling of the lighting). This cycle can repeat several times until the temperature inside is on a suitable level.

LoOF - low/high speed of the fan operating

The fan keeps the adjusted low speed until the temperature exceeds max. inside temp. of the fixture, then the MH-840 automatically switches from low to high fan-speed.

LoHI - low speed / switch off the lamp operating

The fan keeps the adjusted low speed until the temperature exceeds max. inside temp. then the MH-840 automatically switches off the lamp.

Note: In the mode “HIGH“ and “Auto“- the fan speed can´t be adjusted by DMX.

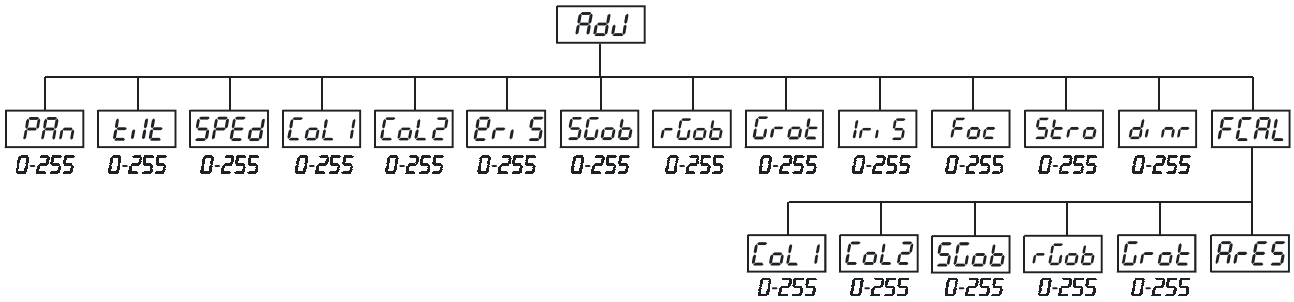
dFSE - Default settings

Press **[Enter]** to reset all fixture personalities (not the adjusting functions) to the default values. On the display will appear **„rSt”** meaning that the fixture makes the reset. See the table of personality setting and their default positions.

Personality	Display	Default value (shaded)
PAN-reverse	rPAn	On
		OFF
TILT-reverse	rtilt	On
		OFF
Resolution	16br	**On**
		OFF
Lamp On automatically	PoOn	On
		OFF
Switch on/off lamp light sensor	EnSn	**On**
		OFF
Display permanent on	d On	**On**
		OFF
Display-intensity	d Int	20 40 60 80 **100**
Display-reverse	turn	**turn**
		usEr
Feedback-fonction	FEEd	**On**
		OFF
Lamp Off via DMX	dLOF	**On**
		OFF
Ventilation fan	FAnS	**Auto**
		HIGH
		rEG
		LoOF
		LoHI

AdJ- Adjusting the default positions of colour, gobo and effect wheels

By this function you can calibrate and adjust the colour, gobo and effect wheels to their standard/right positions. Use the [Up] and [Down] keys to browse through the adjusting menu - the display shows step by step these messages: **" PAn, Tilt, SPEd, Col1, Col2, PriS, SGob, rGob, Grot, IriS, Foc, Stro, dimr, FCAL "** by which you can adjust the fixture to the required / desired position (0-255) before the function calibration. Then when the positioning is finished use the last **"FCAL"** function (Fixture calibration).



1. Calibration via the control board

Press **[Enter]** and the **[Up]** and **[Down]** keys in order to display the following messages: **"Col1, Col2, PriS, SGob, rGob, Grot "** for very smooth function calibration. Select one of them, press **[Enter]** and use the **[Up]** and **[Down]** keys in order to adjust their right value from 0 to 255. Then press **[Enter]** to confirm or **[Mode]** to cancel and return to the menu. This can be repeated for each calibration parameter if it is required. When the calibration is finished, it is necessary to use the **"ArES"** function in order to write the calibration values to the memory (EEPROM) and to make a reset in order to check the newly adjusted positions of the colour, gobo and effect wheels. When the reset of the fixture is finished, the display will show the **"FCAL"** message. Press **[Enter]** to repeat the calibration or **[Mode]** to return to the **"AdJ"** menu.

2. Calibration via the external controller

Press **[Enter]** and the **[Up]** and **[Down]** keys in order to display the following messages: **"Colo, EFEC, rGob, Grot"** - calibration parameters. Select one of them and press **[Enter]**.
Now you can calibrate the colour, gobo and effect wheel by your controller. The DMX calibration protocol is described in the table mentioned below.

DMX Calibration protocol:

DMX Channel	1	2	3	4	5	6	7	8
Function	COL.1	COL.2	SGOB	RGOB	GROT	-	COLOURS 1	COLOURS 2
	CALIBRATION 0 - 255	CALIBRATION 0 - 255	CALIBRATION 0 - 255	CALIBRATION 0 - 255	CALIBRATION 0 - 255	-	STANDARD PROTOCOL	STANDARD PROTOCOL
	SMOOTH MICROSTEP MOVEMENT							

DMX Channel	9	10	11	12	13	14	15	16
Function	PRISM	STATIC GOBOS	ROTATING GOBOS	GOBO ROTATION	IRIS	FOCUS	STROBE	DIMMER
	STANDARD PROTOCOL	STANDARD PROTOCOL	STANDARD PROTOCOL	STANDARD PROTOCOL	STANDARD PROTOCOL	STANDARD PROTOCOL	STANDARD PROTOCOL	STANDARD PROTOCOL

After having calibrated required functions press **[Enter]** to confirm (or **[Mode]** to cancel and return to the menu without reset by the **"ArES"** function) and use the **"ArES"** function in order to write the calibration values to the memory (EEPROM) and to make a reset in order to check the new adjusted positions of the colour, effect and rot. gobo wheels and gobo indexing.

Error and information messages

HEAt

This message appears if you try to switch on the lamp within 5 minutes after having switched it off (the lamp is too hot). The message will appear on the display if the lamp doesn't ignite within 28 seconds. The MH-860 will store this information and automatically ignite the lamp when the 5 minutes period has expired.
Caution: Please note that this function is disabled if the lamp light sensor is switched off (function "EnSn").

LAEr
The ignition of the lamp is seven times unsuccessful (the HEAt message appeared six times before), and the display shows **"LAEr"**, meaning that the lamp could be damaged or even missed, the fixture is overheating (this can occur if the ambient temperature is 45° C or more) or there could be a failure on the ignitor or ballast.
Please place or replace the lamp, check the ambient temperature or contact your dealer if the situation was not caused by the lamp.
Caution: Please note that this function is disabled if the lamp light sensor is switched off (function "EnSn").

nbEr
This message informs you that the main PCB does not communicate correctly with the Control Board.

C 1Er
(Color-wheel 1 error) This message will appear after the reset of the fixture if the magnetic-indexing circuit malfunctions (sensor failed or magnet missing) or the stepping-motor is defective (or its driver circuit on the main PCB). The color-wheel is not located in the default position after the reset.

C2Er
(Color-wheel 2 error) This message will appear after the reset of the fixture if the magnetic-indexing circuit malfunctions (sensor failed or magnet missing) or the stepping-motor is defective (or its driver circuit on the main PCB). The color-wheel is not located in the default position after the reset.

rGEr
(Rotating gobo-wheel error) This message will appear after the reset of the fixture if the magnetic-indexing circuit malfunctions (sensor failed or magnet missing) or the stepping-motor is defective (or its driver circuit on the main PCB). The rotating gobo-wheel is not located in the default position after the reset.

IGEr
(Rotating gobo indexing error) This message will appear after the reset of the fixture and if the magnetic-indexing circuit malfunctions (sensor failed or magnet missing) or the stepping-motor is defective (or its driver circuit on the main PCB). The rotating gobo is not located in the default position after the reset.

SGEr
(Static gobo-wheel error) This message will appear after the reset of the fixture if the magnetic-indexing circuit malfunctions (sensor failed or magnet missing) or the stepping-motor is defective (or its driver circuit on the main PCB). The gobo-wheel is not located in the default position after the reset.

PrEr
(Prism-wheel error) This message will appear after the reset of the fixture if the magnetic-indexing circuit malfunctions (sensor failed or magnet missing) or the stepping-motor is defective (or its driver circuit on the main PCB). The prism-wheel is not located in the default position after the reset.

FtEr
This error message informs you that the fixture was overheating (occured if the ambient temperature is 45° C or more) and that the relay switched off the lamp. This message will appear on the display until the temperature will be on a suitable level, then the display will show the HEAt message meaning the lamp is too hot (explanation see above).

SnEr
This message appears if the lamp lighting sensor is failed. Please contact your dealer.
Caution: Please note that this function is disabled if the lamp light sensor is switched off (function "EnSn").

PoEr
This message will appear if the fixture was shortly disconnect from the mains.

PAEr
(PAN-yoke movement error) This message will appear after the reset of the fixture if the yoke's magnetic-indexing circuit malfunction (sensor failed or magnet missing) or the stepping-motor is defective (or its driving IC on the main PCB). The yoke is not located in the default position after the reset.

t1 Er
(TILT-head movement error) This message will appear after the reset of the fixture if the head's magnetic-indexing circuit malfunctions (sensor failed or magnet missing) or the stepping-motor is defective (or its driving IC on the main PCB). The head is not located in the default position after the reset.

FrEr
This message will appear if the frequency of the mains is not standard 50 or 60 Hz.

Technical specifications

Power supply
EU-model: 210/230/250 V AC, 50/60 Hz ~
US-model: 100/120/210/230/250 V AC, 50/60 Hz ~
Power consumption: 900 W
Fuse: T 5 A, 250 V

Lamp
OSRAM HSR 575/2 95 V/575 W GX-9,5 or PHILIPS MSR 575/2 95 V/575 W GX-9,5, MSD 575 95 V/575 W GX-9,5

Optical System
- High luminous-efficiency parabolic mirror and double condenser system
- Multi-Step Zoom (15°, 18°, 22°)
- All lenses are anti-reflection coated

Colours
Colour wheel 1:
- 9 dichroic-filters plus white, colour-wheel with variable rotation speed

Colour wheel 2:
- 6 dichroic-filters, colour temperature filters 3200 K and 6000 K, UV filter plus white

Gobos
Static gobos:
- 9 metal gobos plus full circle
- Static gobo wheel cont. rotation

Rotating gobos
- 3 metal gobos, 1 glass gobo and 2 multicolor dichroic gobo rotating in both dirrections at different speeds
- Gobo indexing
- Rotating gobo-wheel cont. rotation
- Outside diameter 27 mm, image diameter 23 mm.

Strobe
- Strobe effect with variable speed (1 - 10 flashes per second)

Dimmer
- Smooth dimmer from 0 - 100 %

Prism
- 3-facet-prism rotating in both directions at different speeds

Focus
- Motorized focus from near to far

Iris
- Motorized iris for different beam diameters

Effects
- 16 Prism-Gobo Macros
- Gobo-Shake function for static gobo-wheel
- Preprogrammed pulse-effects

Motor
- 12 high-quality stepping-motors controlled by microprocessors

Electronics
- Digital serial input DMX-512
- 16 control-channels (full 16 bit protocol):

Channel 1 - Horizontal mirror-movement 8 bit
Channel 2 - Vertical mirror-movement 8 bit
Channel 3 - Fine Horizontal mirror-movement 16 bit
Channel 4 - Fine Vertical mirror-movement 16 bit
Channel 5 - Pan/Tilt speed
Channel 6 - Fan speed, On/Off lamp, reset
Channel 7 - Colour-wheel 1
Channel 8 - No function
Channel 9 - Prism-wheel
Channel 10 - Static gobo-wheel
Channel 11 - Rotating gobo-wheel

Channel 12 - Rotating gobo index, rotating gobo rotation
Channel 13 - Iris
Channel 14 - Focus, multi-step zoom
Channel 15 - Shutter, Strobe
Channel 16 - Dimmer intensity

Pan/Tilt

Pan movement range 530°
Tilt movement range 280°
8/16 bit movement resolution
Automatic Pan / Tilt position correction
Maximum PAN-movement 530° in 3 s
Maximum TILT-movement 280° in 2.2 s

Rigging

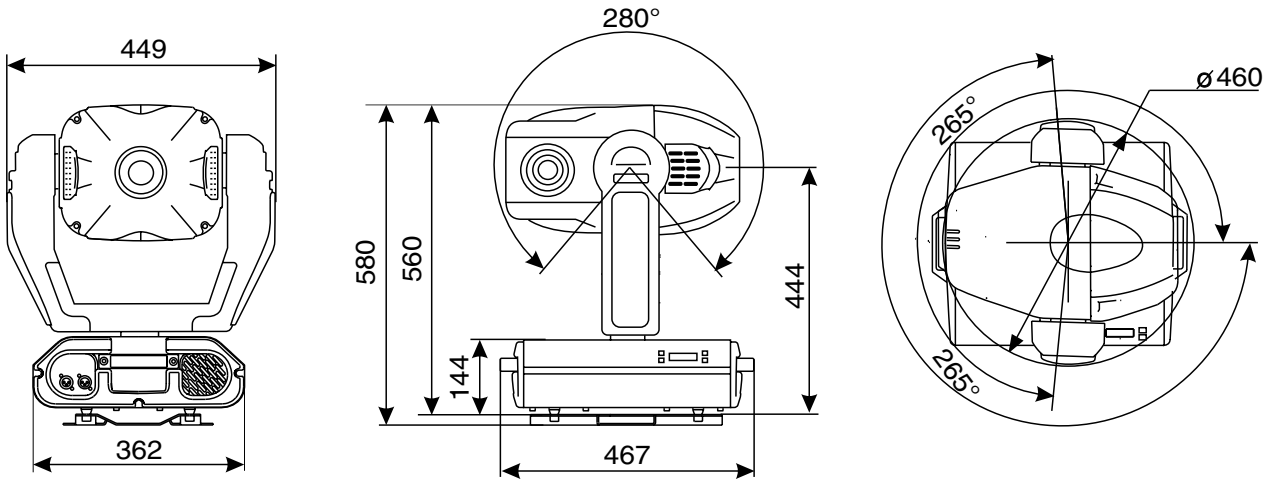
Stands directly on the floor
Mounts horizontally or vertically with 2 clamps
2 truss orientation
Safety chain/cord attachment point

Temperatures

Maximum ambient temperature t_a: 45° C
Maximum housing temperature t_B (steady state): 80° C

Dimensions and weight

Length of base (including handles): 470 mm
Width of yoke: 450 mm
Height (head horizontal): 580 mm
Weight (net): 33 kg
Shipping weight: 38 kg



Cleaning and maintenance

The operator has to make sure that safety-relating and machine-technical installations are inspected by an expert after every four years in the course of an acceptance test.

The operator has to make sure that safety-relating and machine-technical installations are inspected by a skilled person once a year.

The following points have to be considered during the inspection:

1) All screws used for installing the devices or parts of the device have to be tighly connected and must not be corroded.
2) There must not be any deformations on housings, fixations and installation spots (ceiling, suspension, trussing).
3) Mechanically moved parts like axles, eyes and others must not show any traces of wearing (e.g. material abrading or damages) and must not rotate with unbalances.
4) The electric power supply cables must not show any damages, material fatigue (e.g. porous cables) or sediments. Further instructions depending on the installation spot and usage have to be adhered by a skilled installer and any safety problems have to be removed.

DANGER TO LIFE!
Disconnect from mains before starting maintenance operation!

We recommend a frequent cleaning of the device. Please use a moist, lint-free cloth. Never use alcohol or solvents!

CAUTION!
The lens has to be replaced when it is obviously damaged, so that its function is impaired, e. g. due to cracks or deep scratches!

The objective lens will require weekly cleaning as smoke-fluid tends to building up residues, reducing the light-output very quickly. The cooling-fans should be cleaned monthly.

The gobos may be cleaned with a soft brush. The interior of the fixture should be cleaned at least annually using a vacuum-cleaner or an air-jet.

The dichroic colour-filters, the gobo-wheel and the internal lenses should be cleaned monthly.

To ensure a proper function of the gobo-wheel, we recommend lubrication in six month intervals. The quantity of oil must not be excessive in order to avoid that oil runs out when the gobo-wheel rotates.

There are no serviceable parts inside the device except for the lamp and the fuse. Maintenance and service operations are only to be carried out by authorized dealers.

Please refer to the instructions under "Installing/Replacing the lamp".

Replacing the fuse

If the lamp burns out, the fine-wire fuse of the device might fuse, too. Only replace the fuse by a fuse of same type and rating.

Before replacing the fuse, unplug mains lead.

Procedure:

Step 1: Unscrew the fuseholder on the rearpanel with a fitting screwdriver from the housing (anti-clockwise).
Step 2: Remove the old fuse from the fuseholder.
Step 3: Install the new fuse in the fuseholder.
Step 4: Replace the fuseholder in the housing and fix it.

Should you need any spare parts, please use genuine parts.

If the power supply cable of this device becomes damaged, it has to be replaced by authorized dealers only in order to avoid hazards.

Should you have further questions, please contact your dealer.

Appendix

We hope you will enjoy your MH-860. We can assure you that you will enjoy this device for years if you follow the instructions given in this manual.

Should you have further questions, do not hesitate to contact your local dealer.

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